

5G, Gear Up

Joint with Industry to Facilitate Large Scale 5G Commercialization

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5G Product Line, Huawei

2019.08



In first wave market, government leading the 5G strategy



- Strategy: 5G is taken as one of the national strategies
- Reduction and exemption of spectrum license fee for 5G
- 2019: large scale E2E commercial, **100k+ 5G base station deployment**
- 2019H1: **Set up 5GAIA** (5G Applications Industry Alliance) to explore the application of 5G in various industries
- 2020: National wide 5G deployment



5G Strategy for Germany

- Step up co-usability of passive carrier infrastructures
- Support investment in 5G networks with modern frequency policy
- The 5G Dialogue Forum



A 5G Strategy for the UK

- Ensure 5G infrastructure on motorways and railroads by 2025
- Coordinate local government assets and infrastructure
- Guarantee minimum service level obligation & adjust regulatory regime

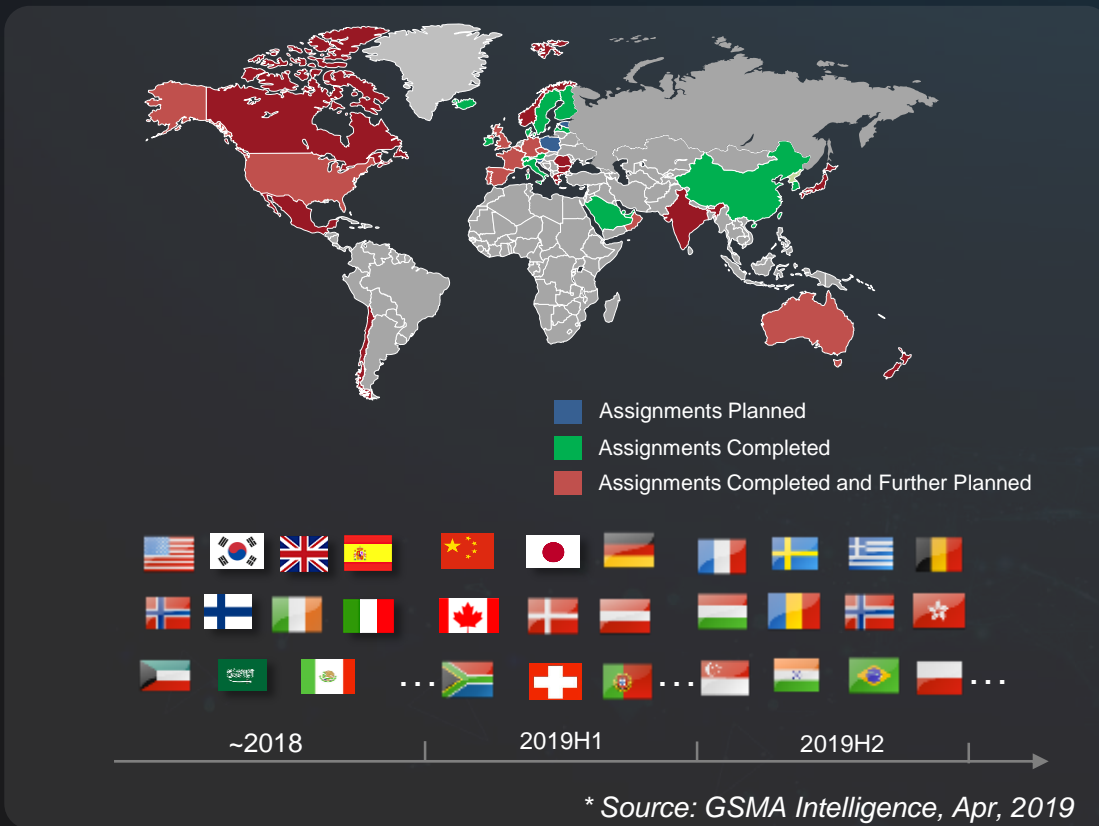


Jan.2014 released **“Creative 5G Mobile Strategy”**

- Large Investment: From 2015 year ,about 1.4Billon \$ investment from government
- E2E Considering: Based on the industries advantage, include content, platforms, networks, terminals, multiple areas plan
- April.2019 released **“5G Plus strategy ”** . To drive private investment through public investment and focusing on 10 core industries and 5 core services (VR/AR,V2X,smart city etc.)

5G is on fast track, 25 networks already commercialized and 40+ countries will get 5G spectrum by 2019

27 markets have already got 5G spectrum, 40+ countries will have 5G spectrum ready by 2019

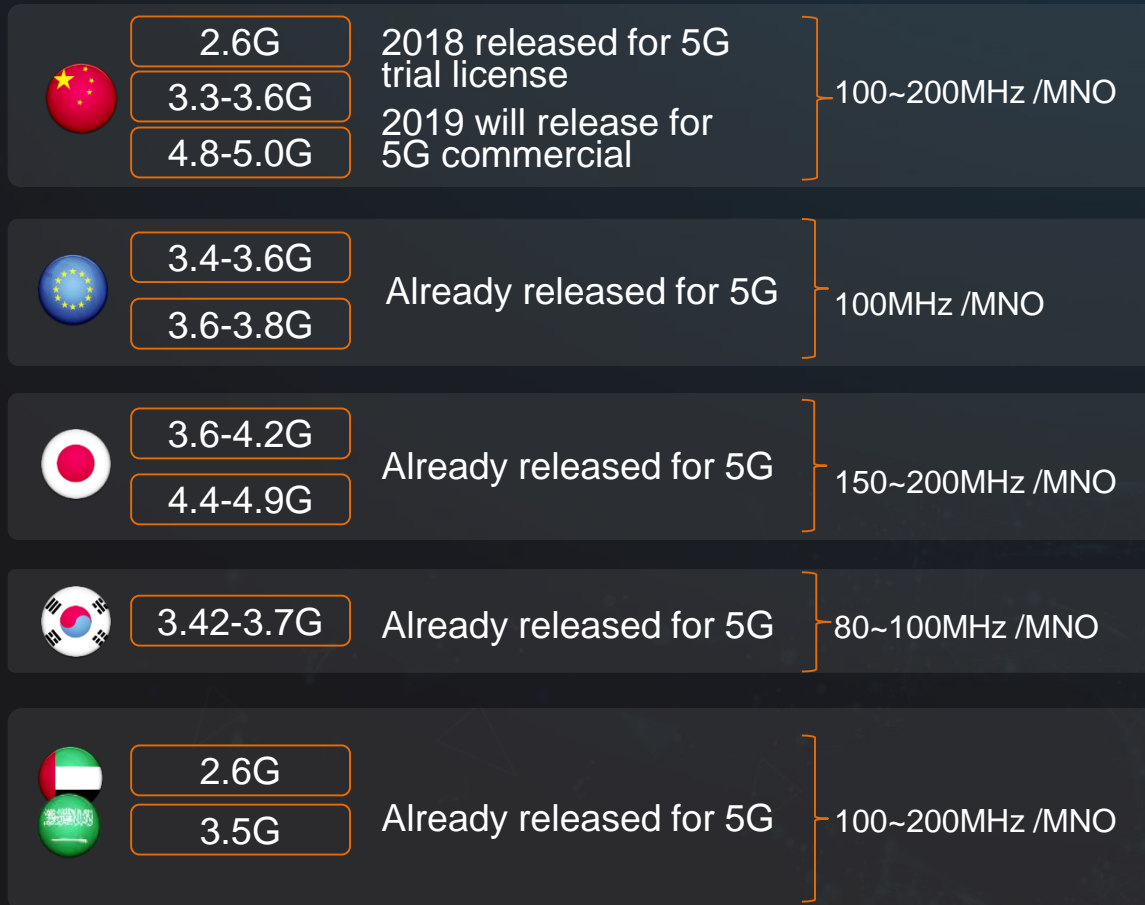


25 commercial 5G networks were launched in 2019Q2 and 86 operators announced plans



80-100MHz/operator@ C-band/TDD 2.6/2.3G has become the trend

C-band/2.6G 100MHz/operator in China, Japan, Korea, EU



5G oriented spectrum allocation for TDD 2.6G and 2.3G if C-band not enough

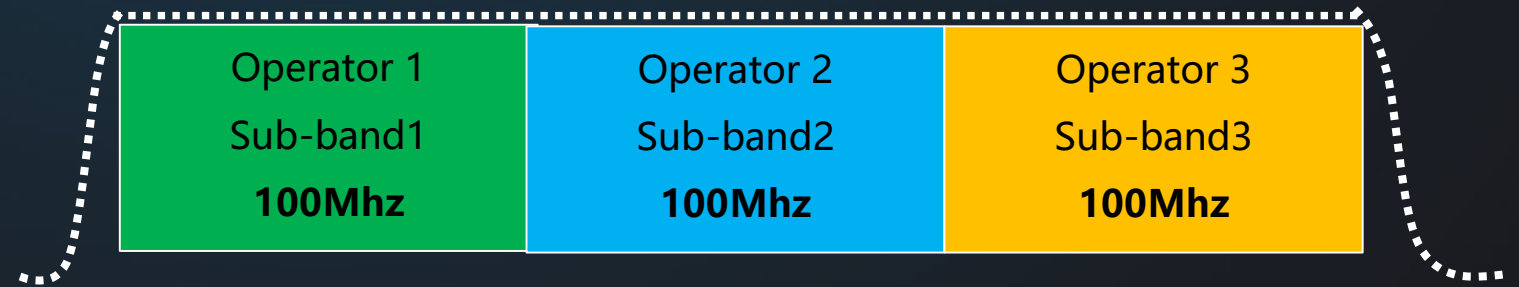


5G NR asynchronous operation wastes at least 25 MHz guard band

Asynchronous 5G NR TDD Requires $\geq 25\text{MHz}$ Guard-band

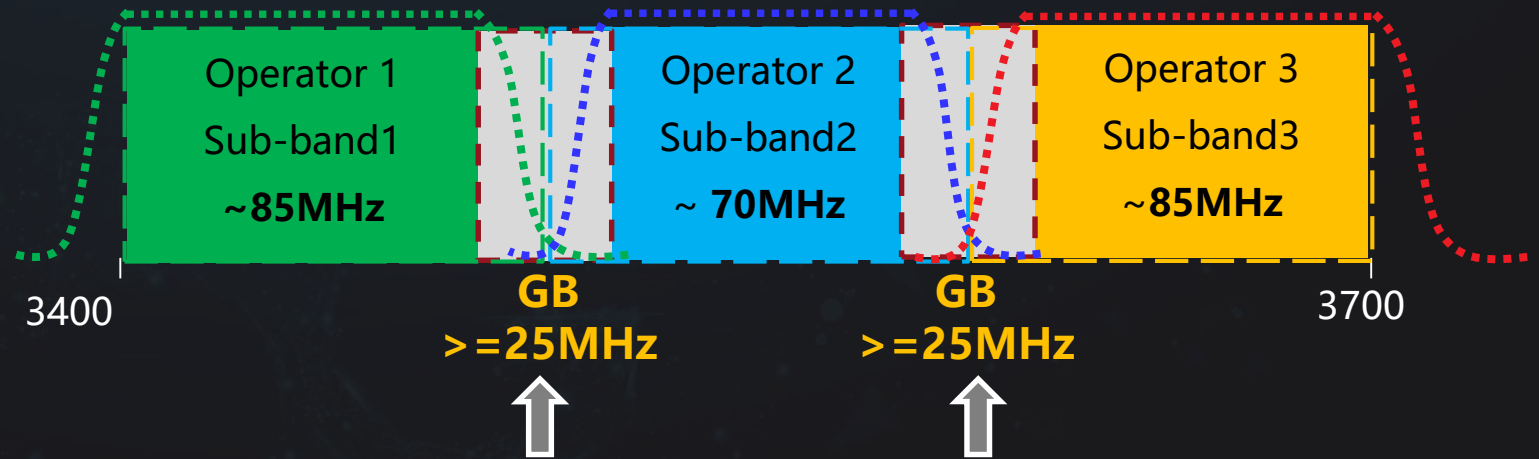
Synchronous Operation


- Global eco-system
- Band specific receiver filter design(cheap)
- Common frame structure



Asynchronous Operation

- Operator specific receiver filter design(very expensive)
- Inter-operator GB $\geq 25\text{MHz}$

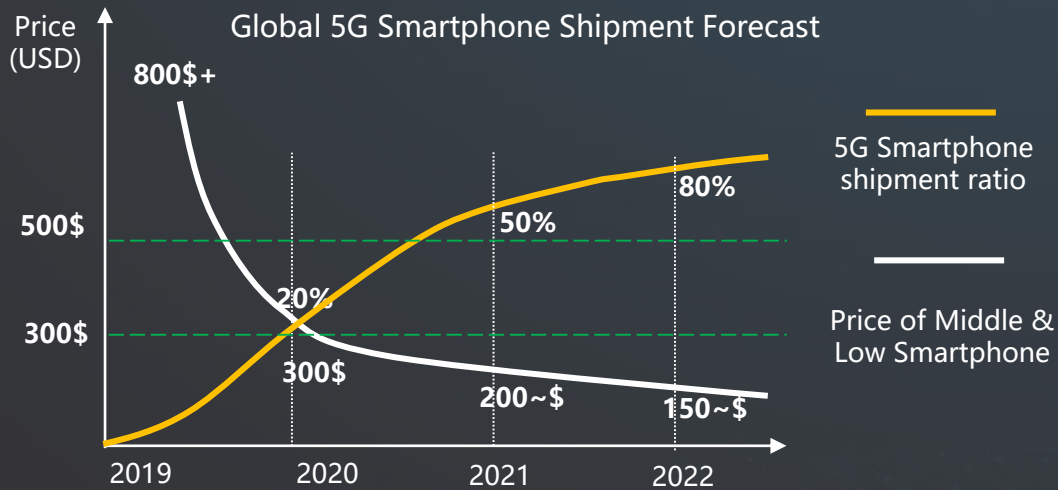


For avoiding Interference, Unsynchronized Scenario
ECC Spurious emission requirement $< -43\text{dBm}/5\text{MHz TRP}$  HUAWEI

2020 5G smartphone: 20% of smartphone shipment, 300USD low-end will be available

2020, 300USD 5G smartphone will be available

100+ 5G Terminals is Released by Aug. 2019



Source: Huawei MI, 2019

- 2020, 300~500USD will account for 20% of total smartphone shipment
- 2021, 5G shipment will account for 50%, 200USD will be available

- Quick Launch, Mass Release, Various Type & Affordable Price
- Large, Foldable, Multiple Screen will be the standard for 5G smartphone

Smart Phones



CPE Devices



hotspots



modules



snap-on dongles/adapters



USB terminals



Source: GSA, Jun 2019

Industries are actively exploring more 5G services, joint innovation is the key

Industries explore 5G services in earlier, mid-long stage

Earlier stage: focus eMBB service



5G video and game



Cloud AR/VR



Gbps WBB for Home service

Middle-long term: Focus on vertical industry with low latency, massive connection



Connected car
Entertainment & Autopilot



Smart Manufacturing
Real-time cooperation & Online DIY



Drones
Remote Control



Robot
Real-time Manipulation & Cloud Intelligence

Building 5G ecosystem around 5 use cases

Connected automotive



Wireless robotics



Wireless eHealth



Cloud VR/AR



Connected drones

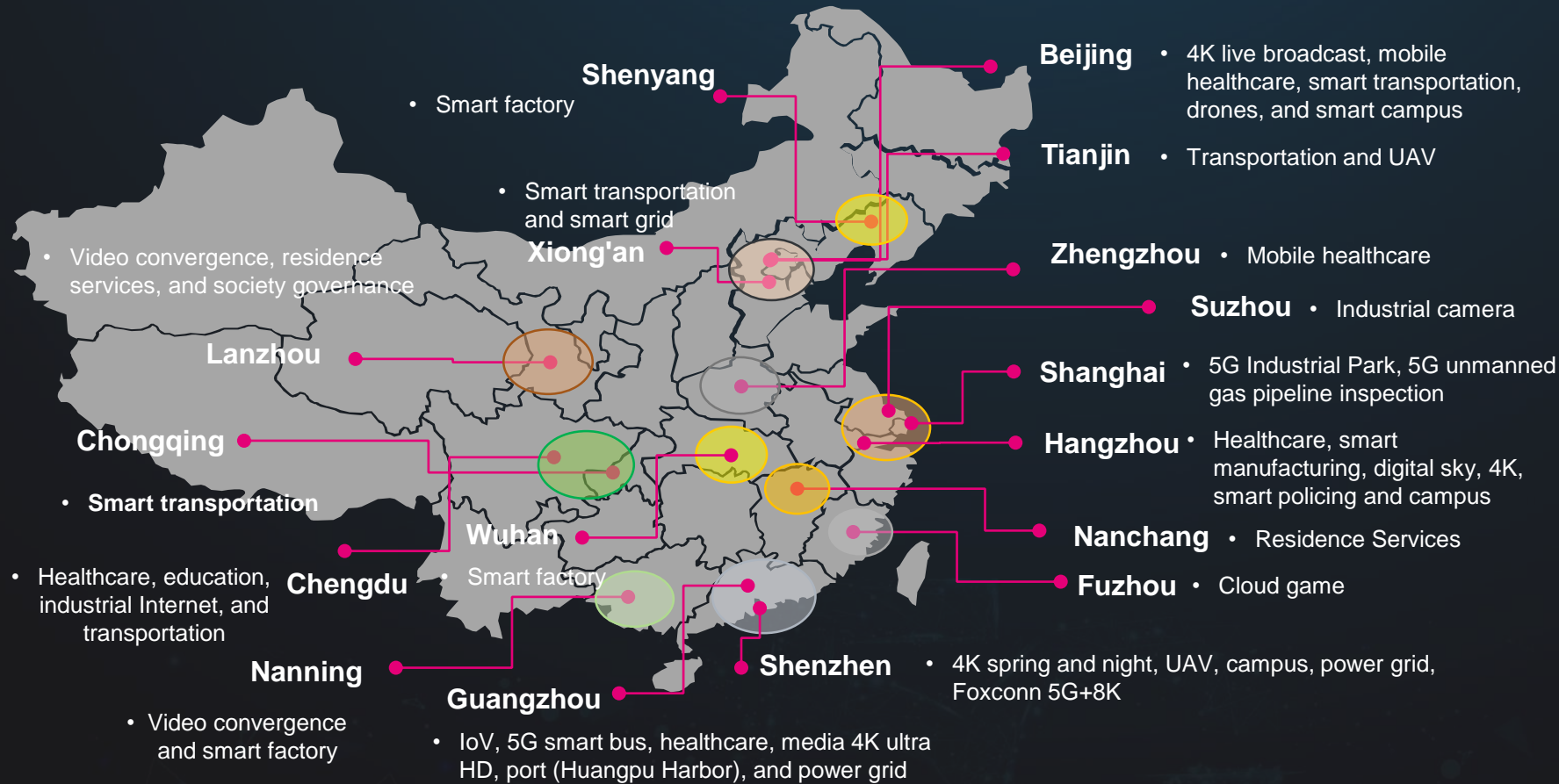


50+ top carrier partners with **9** joint/mobile innovation centers

289+ industry partners

51+ innovation projects

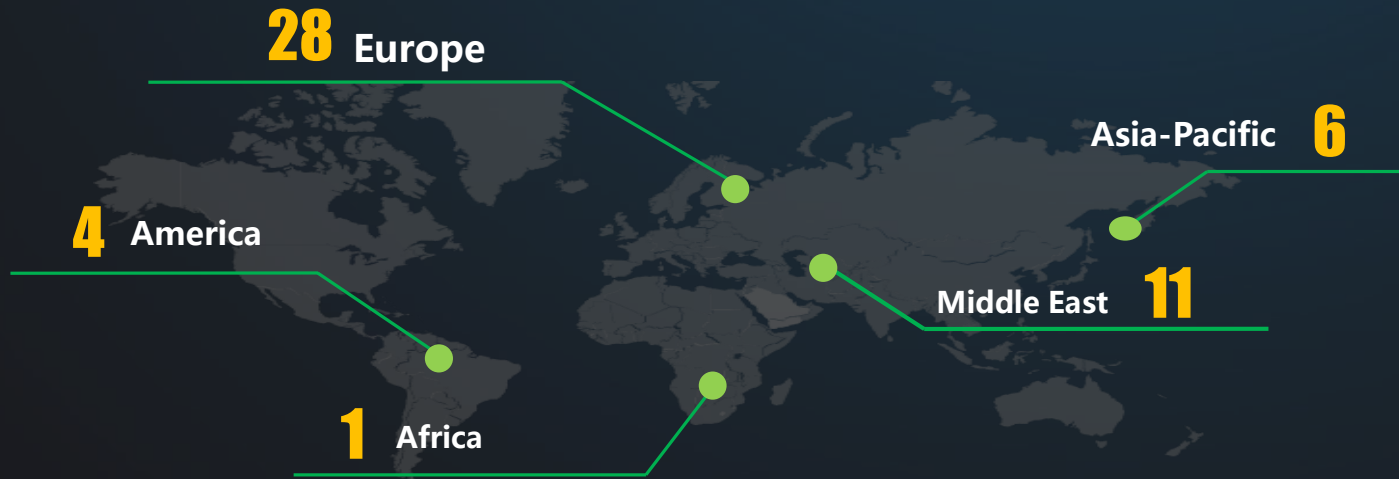
China: Actively explore 5G industry applications in 30+ cities



MNOs, Venders, Application Providers joint with Vertical Industry to prosper the 5G ecosystem

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HUAWEI's 5G commercialization accelerating worldwide



50
Commercial Contracts

150,000+
Shipments

by end of 2019H1

Capacity	Coverage	Cost
<p>mmWave C-Band TDD 2.3~2.6GHz Sub 1GHz</p>	<p>3D-Shaping (DL Coverage) UL&DL Decoupling (UL Coverage) 5G LampSite (Indoor Coverage)</p>	<p>Simplified Site Autonomous Driving Network Energy Saving</p>

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connected, intelligent world.

Thank You

